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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/787,169	02/27/2004	Jun Wang	V9661.0056	4887

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EXAMINER	
RAYMOND, BRITTANY L	
ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
07/16/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/787,169	WANG ET AL.	
	Examiner	Art Unit	
	BRITTANY RAYMOND	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7,9,10,12 and 15-20* is/are pending in the application.

4a) Of the above claim(s) *16-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7,9,10,12 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 7, 9, 10, 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pforr (U.S Patent 6627392) in view of Baselmans (U.S. Patent Publication 2005/0136340) and Mori (U.S. Patent Publication 2004/0021841).

Pforr discloses a process of forming two masks from a denser patterned mask and imaging each mask pattern onto a substrate one after another (Column 4, Lines 15-23), as recited in claim 7 of the present invention. It is apparent from Figures 1 and 2 that features are placed onto a dense grid with rows and columns and the grid is split up into two sparser grids, one containing the first and fourth subsets of features and the other containing the second and third subsets of features, as described in claim 7 of the present invention. Pforr states that the original pattern has high-density structural detail

(Column 1, Lines 58-67), which is equivalent to saying the circuit area is minimized, as recited in claim 9 of the present invention.

Pforr fails to disclose that assist features are added to the grid points and that they are placed on the grid points that do not have real features on them, that the assist features are sized so that they do not print but allow illumination to be optimized, that the distance between two adjacent real features and the distance between two adjacent features is no less than minimum pitch of single-exposure lithography, and that quadrapole illumination sources with the poles of the quadrapole illuminations placed on the x-axis and y-axis are used for exposing the two masks.

Baselmans discloses a method of making a mask comprising: defining a plurality of pattern features and a plurality of assist features, each at selected locations (Paragraph 0023), as recited in claim 7 of the present invention. It is apparent from Figures 3 and 4 that the features are placed on a grid with even and odd-number columns and rows (first-fourth subsets as described in the claims of the present invention), and are spaced in a certain way or have particular grid pitches, as recited in claim 7 of the present invention. Figures 3 and 4 also show that the assist features are introduced at locations, 151,152, etc., that do not have pattern features, as recited in claim 10 of the present invention. Baselmans also discloses that the assist features are not intended to appear in the pattern developed in the resist, but are used to improve the image (Paragraph 0019), as recited in claim 7 of the present invention. Baselmans states that a beam is projected through the mask to form a pattern on a substrate (Paragraph 0003), as recited in claim 7 of the present invention. Since only one

exposure is being performed through one mask, the features must be spaced so that the distance between two adjacent real features and the distance between two adjacent features is no less than minimum pitch of single-exposure lithography, as recited in claims 12 and 15 of the present invention.

Mori discloses a double exposure process which uses a quadrapole illumination source (Paragraphs 0067 and 0068), as recited in claim 7 of the present invention. Mori states that it is an off-axis illumination and it is apparent from Figure 3 that the poles of the quadrapole illuminations are on the x-axis and y-axis, as recited in claim 7 of the present invention.

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have included sub-resolution assist features in the dense pattern of Pforr, as suggested by Baselmans, because Baselmans teaches that assist features allow for the pattern features to have improved critical dimensions. It also would have been obvious to one of ordinary skill in the art to have used a quadrapole illumination source with the poles of the quadrapole illuminations placed on the x-axis and y-axis for exposing the two masks of Pforr, as suggested by Mori, because Mori teaches that this type of illumination improves the resolving power so that a more accurate photoresist pattern can be formed.

Response to Arguments

3. Applicant's arguments filed 4/23/2008 have been fully considered but they are not persuasive.

Applicants argue that Baselmans does not teach that assist features are located at each of the grid points not occupied by a real feature. Figure 4 of Baselmans shows that real and assist features are placed on a grid with rows and columns, and that the assist features are placed at each of the grid points that are not occupied by a real feature. It is apparent from Figure 4 that there are no unoccupied grid points.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRITTANY RAYMOND whose telephone number is (571)272-6545. The examiner can normally be reached on Monday through Friday, 8:30 a.m. - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/
Supervisory Patent Examiner, Art Unit 1795

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